

# PATENT SPECIFICATION

973,639

DRAWINGS ATTACHED.

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## COMPLETE SPECIFICATION.

### Improvements in or relating to Arrangements for Transporting and Depositing Printed Copies in Piles.

- I, JOSEF FUNK, trading as JOSEF FUNK K.G., of 72 Wilhelmstrasse, Karlsruhe (Baden), Germany, a Citizen of the Federal Republic of Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement :—
- The invention relates to conveyor arrangements for transporting and depositing printed copies in piles. Printed copies, such as newspapers, magazines, booklets, catalogues, as they arrive from a rotary printing press have to be stacked in piles. Usually each pile must contain a predetermined number of copies. It is often desired to add to papers, magazines or the like, inserts such as advertising material.
- It is an object of the invention to provide a simple arrangement for performing such operations.
- The invention consists in an arrangement for transporting printed copies individually delivered from a printing machine and depositing them in one or more piles at a stacking position comprising a main conveyor extending in a generally horizontal direction and an auxiliary conveyor, both conveyors travelling at substantially equal speeds, the auxiliary conveyor having a plurality of means for receiving successive individual printed copies fed to it in spaced relationship and continuously conveying said copies in succession to a transfer point underneath the main conveyor where a lower part of the main conveyor and a part of the auxiliary conveyor are guided in adjacent relationship, said copies being supported in equal spaced relationship in a substantially vertical position upon the upper track of the auxiliary conveyor in the region of the transfer point, said main conveyor carrying a series of grippers spaced to correspond substantially with the spacing of the vertically positioned copies and having means for automatically operating the grippers such that each gripper is operated at the transfer point to grip a printed copy and is operated again adjacent the stacking position to release the copy, said copies being suspended vertically from the grippers whilst travelling between the transfer and the point of release, a counting device being positioned between the transfer point and the release point, said counting device being operated automatically by the passage of each copy before said copy is released, whereby to count the number of copies in the pile or piles.
- For dealing with inserts a second auxiliary conveyor may be arranged adjacent the main conveyor but remote from the first auxiliary conveyor and the grippers of the main conveyor are used also for picking up inserts from the second auxiliary conveyor and inserting them in the copies on the first auxiliary conveyor before said copies are conveyed to the transfer point.
- Auxiliary means may be provided, on the main conveyor for automatically operating the grippers when adjacent the second auxiliary conveyor for the purpose of picking up the inserts after a printed copy containing an insert has been released and deposited at the stacking position, the said inserts being transported by the main conveyor to the first auxiliary conveyor where the said grippers are operated by further auxiliary means so that the inserts are released and deposited into the printed copies on the first auxiliary conveyor before

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the copies reach the transfer point to the main conveyor.

Preferably the second auxiliary conveyor extends in a generally vertical direction and the conveyors are operated in such a manner that printed copies are transported to the stacking position by the lower track of the main conveyor while the inserts are transported by the upper track of the main conveyor in the opposite direction.

Conveniently the first and second auxiliary conveyors have copy supporting abutments which are generally similar, the first auxiliary conveyor being substantially horizontal and comprising an endless chain having abutments on the chain members for erecting and supporting the printed copies in the substantially vertical position, and the second auxiliary conveyor comprising an endless chain having abutments on the chain members for supporting and conveying the inserts in a substantially horizontal position.

Each gripper may comprise a pair of rotatable co-engaging arms keyed respectively to a pair of shafts extending in adjacent parallel relationship transverse to the conveyor so that the arms extend substantially radially outward when passing over the main conveyor guide wheels and sprocket wheels. The arms are normally held in engagement with each other by a torsion spring coiled around one of the two shafts and having a part bearing upon a control lever fixed to said shaft and a second part upon a relatively fixed abutment.

Control rails may be provided at a fixed part of the conveyor frame for tripping the control levers whereby the grippers are automatically opened and closed. Advantageously, at the stacking position, a plurality of control rails is provided for operating the grippers so as to deposit the printed copies in a plurality of piles, at least one of said control rails being removable from an operative into an inoperative position.

The abutments may be formed by struts, tubes being provided on said struts for the supply of suction or compressed air, the tubes having ports acting alternately as suction ports and pressure ports for operating upon parts of the printed copies between said abutments at different stages in the travel of the conveyor to the transfer point. A chamber for air of reduced pressure and a chamber for air of increased pressure may be provided in the first auxiliary conveyor, the chambers lying in series in the direction of travel of the first auxiliary conveyor so that the tubes are successively connected to said chambers as the tubes travel past said chambers.

The counting device may comprise a photoelectric pulsing device associated with a counter, which latter actuates control means for two or more control rails so that after

each pile of a predetermined number of printed copies has been formed a different control rail is rendered inoperative until the last pile has been formed.

The main conveyor with its additional equipment thus performed three functions:—

1. It picks up the printed copies together with the inserts as single entities and transports them suspended one behind the other to the stacking position;

2. It counts the printed copies with inserts and drops them to form the piles, each having a predetermined number of copies.

3. It picks up the inserts from the second auxiliary conveyor and transports them to the first auxiliary conveyor where the printed copies are opened, the inserts being inserted in the opened copies.

The first auxiliary conveyor performs the following functions:—

1. It prepares the printed copies arriving from a printing press in such a manner, that the inserts arriving on the main conveyor can be added to the printed copies.

2. It brings the printed copies, after the inserts have been added, into a transfer point out of which they can subsequently be taken over one after the other, by the grippers of the main conveyor.

To make the invention clearly understood reference will now be made to the accompanying drawings, which are given by way of example and in which:—

Fig. 1 illustrates a side view of an arrangement of the invention;

Figs. 1a and 1b, illustrate part of the arrangement of Fig. 1 on a larger scale;

Fig. 2 illustrates a part of the main conveyor in side elevation;

Fig. 2a illustrates a chain link of the main conveyor with a gripper in plan view;

Fig. 2b illustrates the elements shown in Fig. 2a in side elevation;

Fig. 3 illustrates a conveyor chain in plan view;

Fig. 4 illustrates a section along the line IV—IV of Fig. 3;

Fig. 5 illustrates a gripper in plan view;

Fig. 6 illustrates an elevation of the gripper of Fig. 5;

Fig. 7 illustrates the gripper from another view, partly in section;

Fig. 8 illustrates a section along the line VIII—VIII of Fig. 7; and

Fig. 9 illustrates a detail of the arrangement.

A main conveyor 1 (Fig. 1) comprises an endless chain which is guided by rollers 2 and 2<sup>1</sup>, and is driven by a sprocket wheel 3 which in turn is driven by any suitable drive not shown.

From a rotary printing press (not shown) individual printed copies 5 (Fig. 1a) for example newspapers, magazines, arrive in

the substantially horizontal position while folded on a conveyor belt, not shown, and are automatically transferred in any suitable manner known *per se* to a first auxiliary conveyor 10 and are erected by said conveyor and fed to a transfer point 11 (Fig. 1a), where they are picked up automatically one behind the other by grippers 12 provided on the main conveyor 1 and are vertically suspended therefrom transversely to the direction of travel of the main conveyor 1 which transports the printed copies to a stacking position 20.

The first auxiliary conveyor 10 comprises a plurality of abutments 15 forming compartments between them, the abutments 15 being provided on an endless chain of the first auxiliary conveyor, the compartments receiving the printed copies, one in each compartment.

Above the stacking position 20, the location of which can be chosen as desired within the range of the lower track of the main conveyor 1, the grippers 12 are automatically opened by a control rail 16a (Fig. 1b) (which if desired may be replaced by a cam or similar control element). The printed copies 5 slide across one of each pair of guide plates 18 to a first stacking position 20a where a predetermined number of copies are deposited one on top of the other to form a pile. As shown in Fig. 1, a second pile may be formed at 20b in a manner to be described.

At a storage position 25 adjacent the lower portion of the main conveyor 1 advertisements, leaflets, booklets or like printed matter are provided for use as inserts 26, which are fed by a sheet feeding means 28 to a secondary auxiliary conveyor 29 which is positioned adjacent the rear roller 2<sup>1</sup> and is of similar construction to the first auxiliary conveyor 10 except that it is not provided with the compressed air and suction devices. At the rear roller 2<sup>1</sup> of the main conveyor 1, a control rail 16c is provided, which controls the grippers 12 in such a manner that they pick up the inserts 26 automatically and transport them *via* the upper track of the main conveyor 1 towards the front roller 2. In the neighbourhood of the roller 2, a further control rail 16d (Fig. 1a) automatically opens the grippers 12 so that the inserts 26 drop into the printed copies on the first auxiliary conveyor 10, after the copies 5 thereon have been opened in a manner described further below.

The main conveyor 1 comprises a chain having substantially parallel twin chain links 30 and 31 (see Figs. 2 to 4) pivotally joined by pins each carrying two rollers 33 in a guide channel 35. The chain members 30 and 31 also carry pairs of horizontal side rollers 34 and pairs of flanges 36.

Each chain member is provided with a

gripper (Figs. 5 to 8) comprising two arms 40 and 41, which are keyed to two shafts 43 and 44 and meshing by means of teeth 45 for opposite rotation. On each shaft 43 a coiled spring 47 is mounted, which has two parts separated by a central loop 48. The spring 47 is positioned between two control levers 50, which are keyed to the shaft 43 and which are arranged for co-operation with control rails 16a to 16e. In order to tension the spring 47 and to secure the shafts 43 and 44, the loop 48 is anchored into grooves 49 (Fig. 2a) located in the flanges 36. The supporting abutments of the first auxiliary conveyor 10 are in the form of struts 55. Tubes 56 for suction air or compressed air are connected to the struts. The tubes 56 have ports 57 for suction or compression air.

These struts are arranged at uniform intervals upon the chain link members (not shown in detail) and bear against a series of similar struts carried upon other chain link members so that the struts on the respective members form a series of acute angle triangles connected by suitable transverse links so that pockets are formed whose cross-section, normal to the conveyor direction is rectangular, in which the copies 5 are carried when the pockets are passing along the upper track of the conveyor.

In the first auxiliary conveyor 10 two fixed chambers 60 and 61 for air of reduced pressure and air of increased pressure respectively are provided, the tubes 56 slide over the chambers 60 and 61, and thereby openings provided in the said chambers co-operate with the tubes so that the chambers communicate, one at a time with the interior of a tube. When the tubes 56 slide over the suction chamber 60, then through the ports 57 in the respective tubes, one or more leaves of the printed copies 5 deposited on the first auxiliary conveyor 10 are sucked close and are held fast, whilst the remaining parts of the copies fall against the struts 55, whereby the printed copies are folded apart and are ready to receive one of the inserts 26.

Shortly behind the region where an insert 26 drops into a printed copy 5 and close to the control rail 16d, the pressure chamber 61 is positioned in the first auxiliary conveyor 10. The tubes 56 are supplied with compressed air from said chamber 61. Under the action of the compressed air emerging from the ports 57 a previously opened printed copy 5 is again folded together, so that this, together with an insert, is ready for being gripped by a gripper 12 of the main conveyor, the said gripper opening and subsequently closing again under action of a further control rail 16e.

For counting the printed copies 5 with inserts 26 which are to be deposited to form one or more piles 20a and 20b the printed

copies pass a counting station comprising a photo-electric device 65 or an electric micro-switch arrangement.

5 The photo-electric device or the micro-switch of known type is arranged in the immediate vicinity of the release point 16a (Fig. 1b) so that the suspended copies interrupt a light beam, or wipe over a feeler of the micro-switch. The released pulse operates  
10 a counter pre-adjusted to a given number and, when this is reached, the counter emits a control pulse whereby the rail 16a is disabled and the rail 16b is brought into action. At the same time the counter is reset.

15 For example, if the predetermined number of copies is fifty, and when fifty copies have been collected in one pile 20a, the control rail 16a is disabled, whereby the second control rail 16b remains in operative position,  
20 or is brought into operation, so that the printed copies are now conveyed past the control rail 16b, under the action of which the next fifty copies are dropped to form a second pile 20b. When fifty copies have  
25 been counted and piled the previously disabled control rail 16a is returned into operation under the control action of a further control pulse. Thus the control rail 16a is automatically rendered operative again so  
30 that at the first stacking place a new pile 20a is formed. Obviously, in an analogous arrangement more than two consecutive stacking places for forming more than two  
35 piles may be provided and the predetermined number of printed copies in each pile may be different from one another. It is further possible additionally to provide a hand  
40 release to be operated in an emergency for any convenient number of movable control rails such as 16a and 16b.

#### WHAT WE CLAIM IS:—

1. An arrangement for transporting printed copies individually delivered from a  
45 printing machine and depositing them in one or more piles at a stacking position comprising a main conveyor extending in a generally horizontal direction and an auxiliary conveyor, both conveyors travelling at substantially equal speeds, the auxiliary conveyor  
50 having a plurality of means for receiving successive individual printed copies fed to it in spaced relationship and continuously conveying said copies in succession to a transfer point underneath the main conveyor  
55 where a lower part of the main conveyor and a part of the auxiliary conveyor are guided in an adjacent relationship, said copies being supported in equal spaced relationship in a substantially vertical position  
60 upon the upper track of the auxiliary conveyor in the region of the transfer point, said main conveyor carrying a series of grippers spaced to correspond substantially with the spacing of the vertically positioned

copies and having means for automatically operating the grippers such that each gripper is operated at the transfer point to grip a printed copy and is operated again adjacent the stacking position to release the copy, said copies being suspended vertically from the grippers whilst travelling between the transfer point and the point of release, a counting device being positioned between the transfer point and the release point, said counting device being operated automatically by the passage of each copy before said copy is released, whereby to count the number of copies in the pile or piles.

2. An arrangement as claimed in Claim 1, wherein a second auxiliary conveyor is arranged adjacent the main conveyor but remote from the first auxiliary conveyor and the grippers of the main conveyor are used also for picking up inserts from the second auxiliary conveyor and inserting them in the copies on the first auxiliary conveyor before said copies are conveyed to the transfer point.

3. An arrangement as claimed in Claim 2, wherein auxiliary means are provided on the main conveyor for automatically operating the grippers when adjacent the second auxiliary conveyor for the purpose of picking up the inserts after a printed copy containing an insert has been released and deposited at the stacking position, the said inserts being transported by the main conveyor to the first auxiliary conveyor where the said grippers are operated by further auxiliary means so that the inserts are released and deposited into the printed copies on the first auxiliary conveyor before the copies reach the transfer point to the main conveyor.

4. An arrangement as claimed in Claim 2 or 3, wherein the second auxiliary conveyor extends in a generally vertical direction and the conveyors are operated in such a manner that printed copies are transported to the stacking position by the lower track of the main conveyor while the inserts are transported by the upper track of the main conveyor in the opposite direction.

5. An arrangement as claimed in any one of Claims 1 to 4 wherein means are provided for depositing the printed copies in a plurality of piles, each pile being formed after a preceding pile has received a predetermined number of printed copies.

6. An arrangement as claimed in Claim 2 or any claim dependent thereon, wherein the first and second auxiliary conveyors have copy supporting abutments which are generally similar, the first auxiliary conveyor being substantially horizontal and comprising an endless chain having abutments on the chain members for erecting and supporting the printed copies in the substantially vertical position, and the second auxiliary conveyor comprising an endless chain having abut-

ments on the chain members for supporting and conveying the inserts in a substantially horizontal position.

5 7. An arrangement as claimed in any one of Claims 1 to 6, wherein each gripper comprises a pair of rotatable co-engaging arms keyed respectively to a pair of shafts extending in adjacent parallel relationship transverse to the main conveyor so that the  
10 arms extend substantially radially outward when passing over the conveyor guide wheels and sprocket wheels.

8. An arrangement as claimed in Claim 7, wherein the arms are normally held in engagement with each other by a torsion spring coiled around one of the two shafts and having a part bearing upon a control lever fixed to said shaft and a second part upon a relatively fixed abutment.

20 9. An arrangement as claimed in Claim 8, wherein the pair of shafts are rotatably mounted in bearings provided by each of a pair of opposite parallel links of a roller chain and said second part of the torsion spring is anchored in a recess provided in at least one of said links to form an abutment for said spring.

30 10. An arrangement as claimed in Claim 8 or 9, wherein control rails are provided at a fixed part of the conveyor frame for tripping the control levers whereby the grippers are automatically opened and closed.

35 11. An arrangement as claimed in Claim 10, wherein adjacent the stacking position a plurality of control rails is provided for operating the grippers so as to deposit the printed copies in a plurality of piles, at least one of the said control rails being movable from an operative into an in-  
40 operative position.

12. An arrangement as claimed in Claim 6 or any claim dependent thereon, wherein the abutments on the first auxiliary conveyor are formed by struts, tubes being provided on said struts for the supply of suction and compressed air, the tubes having ports acting alternately as suction ports and pressure ports for operating upon parts of the printed copies between said abutments at different stages in the travel of the conveyor to the transfer point. 45 50

13. An arrangement as claimed in Claim 12, wherein a fixed chamber for air of reduced pressure and a fixed chamber for air of increased pressure are provided in the first auxiliary conveyor, the chambers lying in series in the direction of travel of the conveyor so that the tubes are successively connected to said chambers as the tubes travel past said chambers. 55 60

14. An arrangement as claimed in Claim 10, wherein the counting device comprises a photoelectric pulsing device associated with a counter, which latter actuates control means for two or more control rails so that after each pile of a predetermined number of printed copies has been formed a different control rail is rendered inoperative until the last pile has been formed. 65

15. An arrangement for transporting and depositing printed copies substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings. 70

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Fig.1

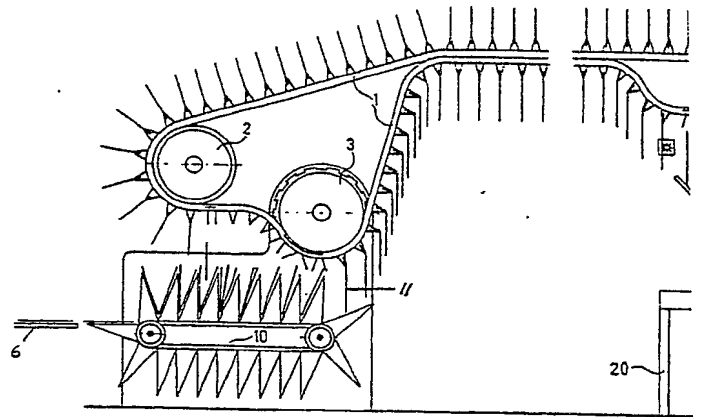
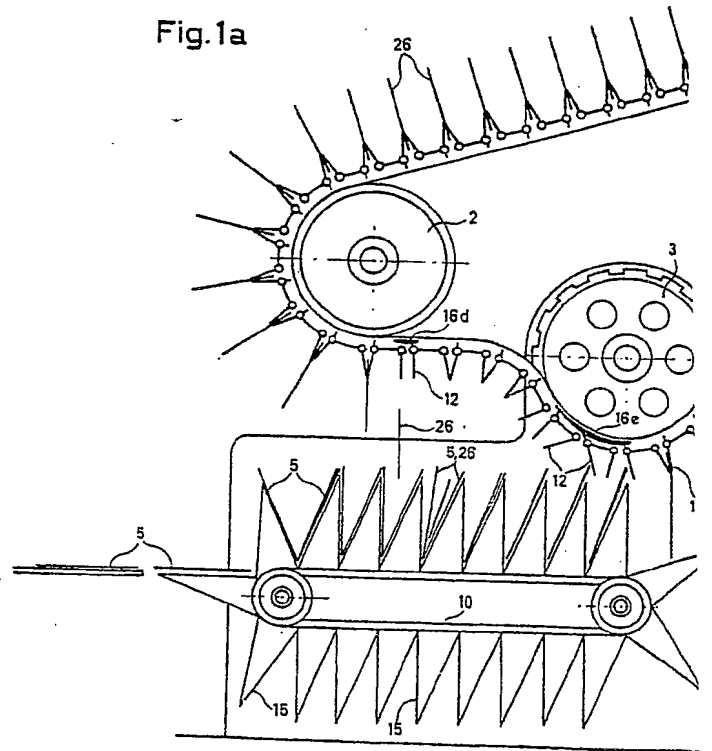


Fig.1a



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Fig.1

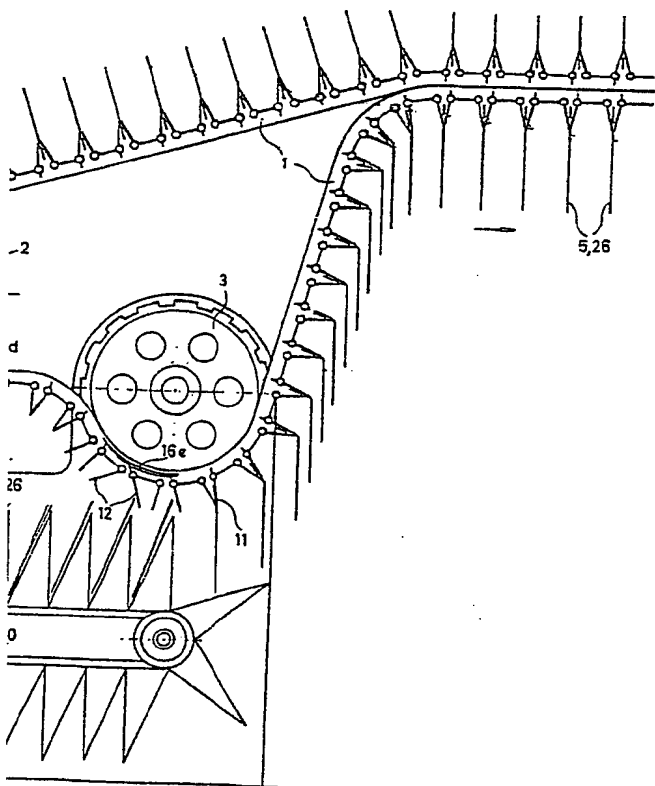
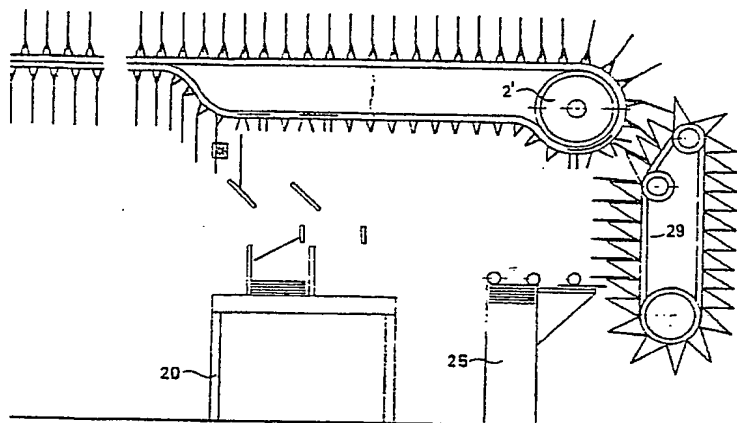


Fig. 1

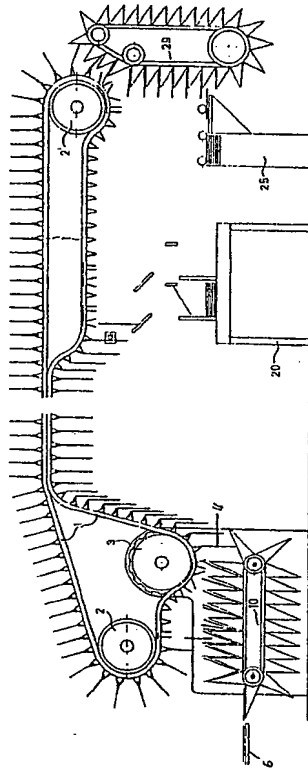
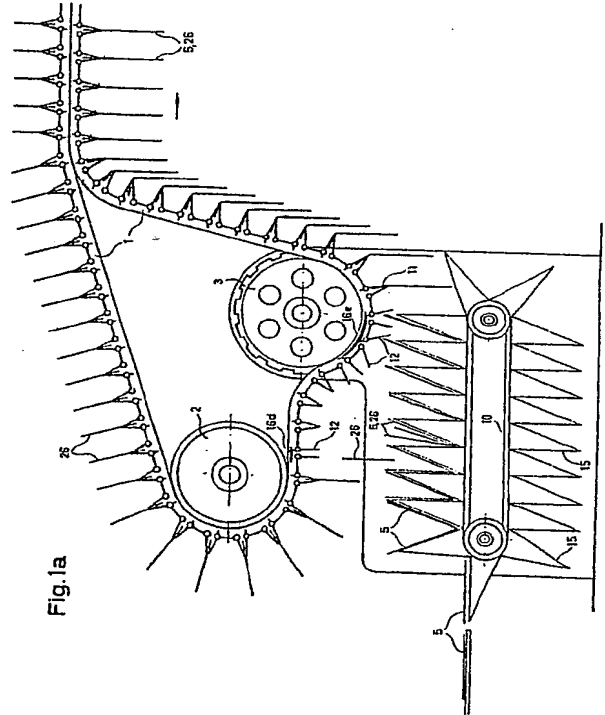


Fig. 1a





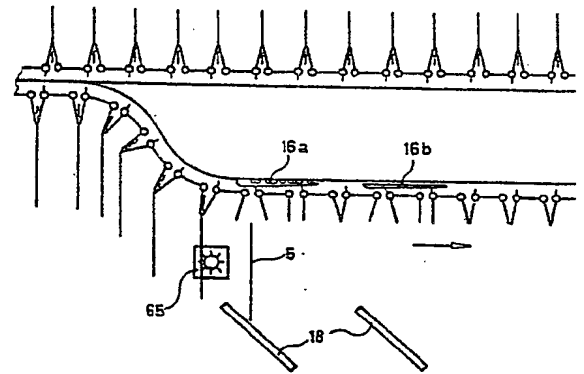
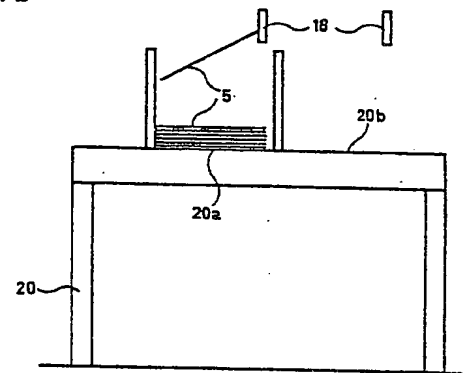


Fig.1 b



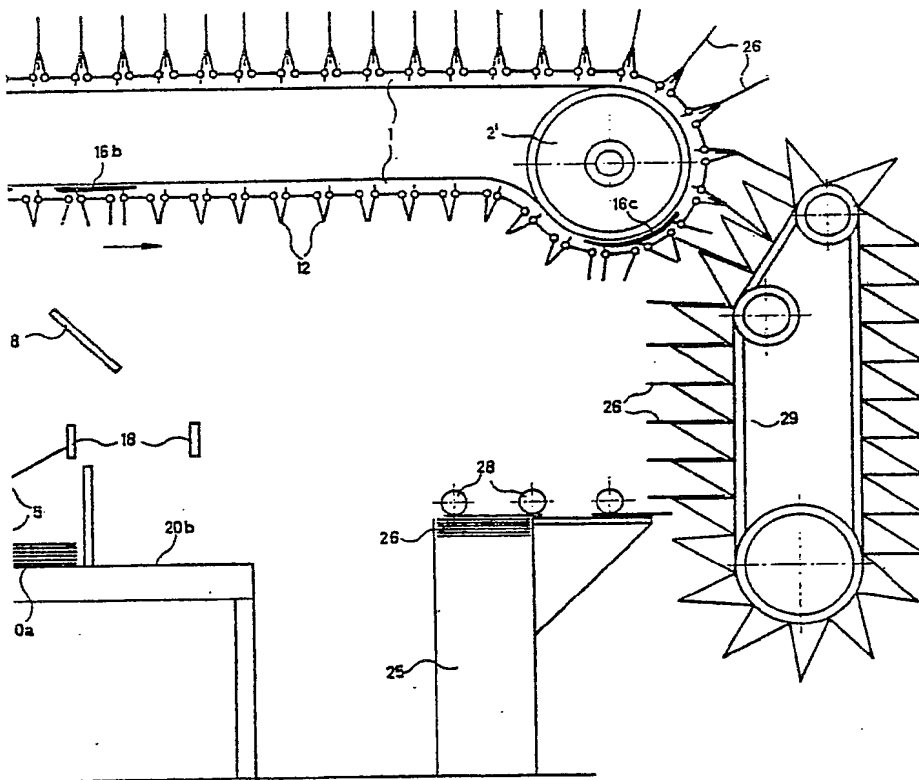
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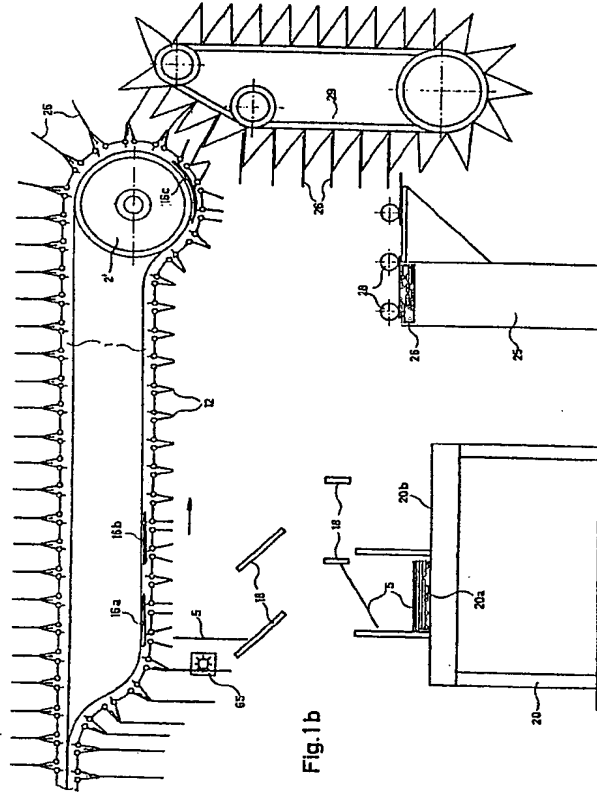
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Sheet 3





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Fig. 2b

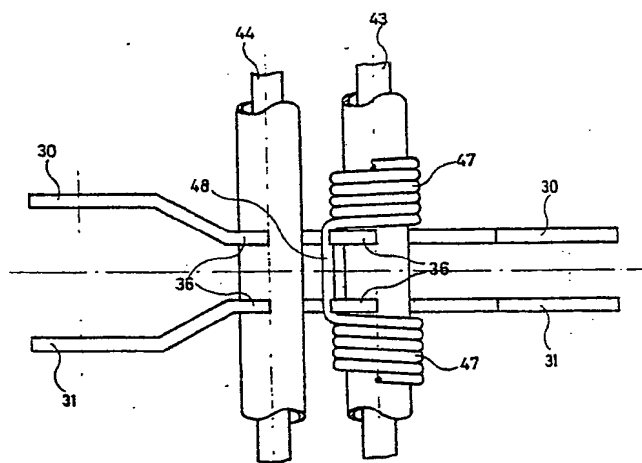


Fig. 2a

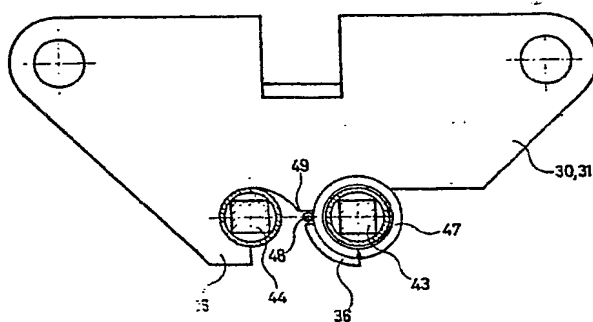


Fig. 3

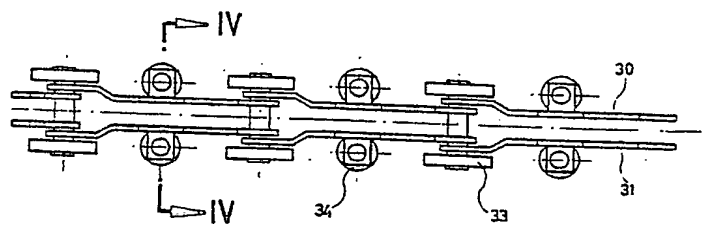


Fig. 2

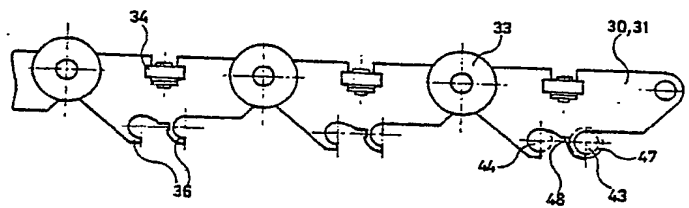
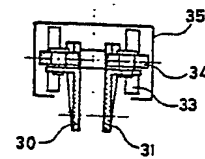


Fig. 4



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Fig.5

Fig.6

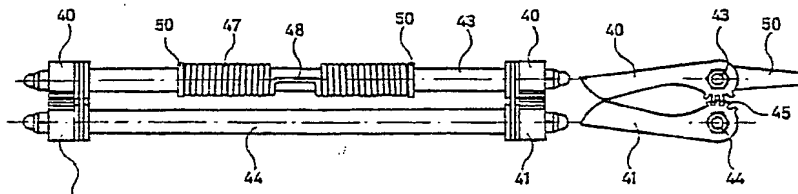


Fig.7

Fig.8

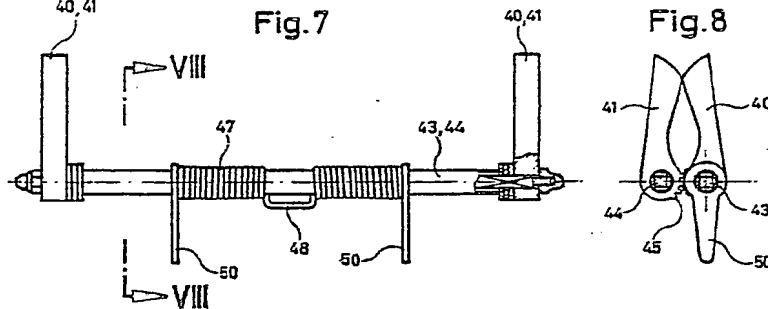
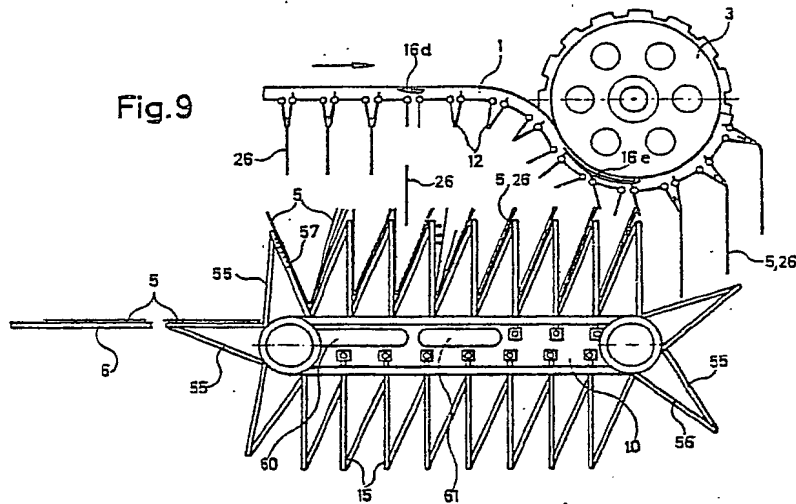
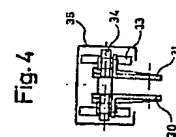
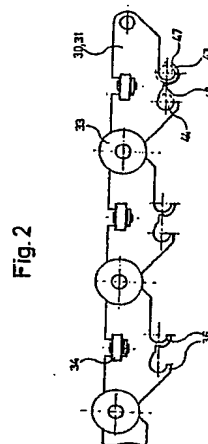
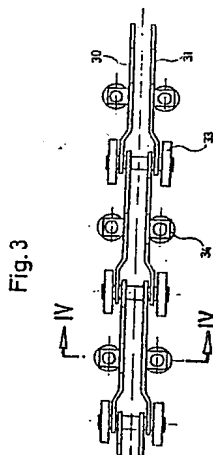
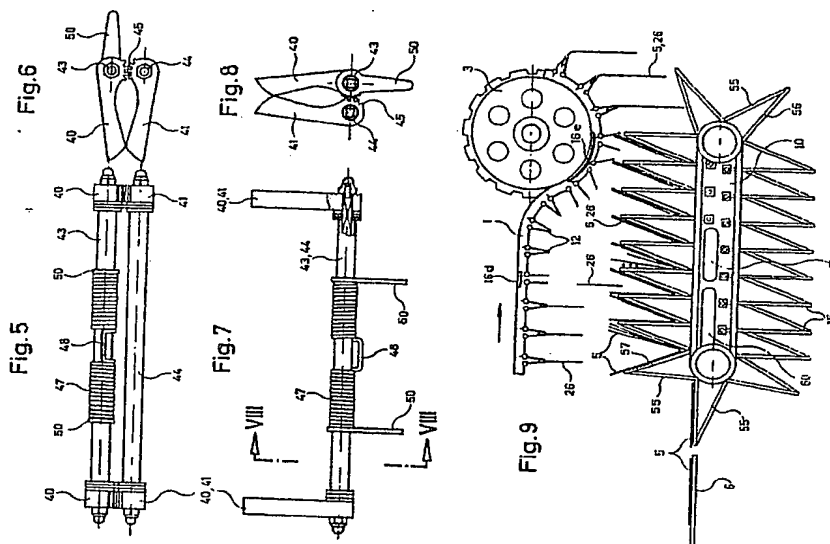


Fig.9





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